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REMARKS

In preparing this response, applicant discovered several numbering errors in the claims as originally filed. Claim Nos. 37 - 39 were used twice, and there was no Claim 48. To correct this error, the second group of Claims 37 - 39 are being renumbered as Claims 40 - 42, original Claims 40 - 47 are being renumbered as Claims 43 - 50, and original Claims 49 - 59 are being renumbered as Claims 51 - 61. References to the claims in these remarks are to the corrected claim numbers.

Claims 24, 59 and 60 (originally numbered as Claims 24, 57 and 58), which the Examiner has indicated are directed to allowable subject matter, are being rewritten in independent form, and applicant trusts that they will now be allowed, along with Claims 25 and 61 (originally Claims 25 and 59) which depend from Claims 24 and 60, respectively.

The rejection of Claims 1 - 61 (originally Claims 1 - 59) under 35 U.S.C. §112 as being indefinite because of the use of the term "species" is not understood. In making the objection, the Examiner says that it is indefinite as to whether "hydrogen species" and "oxygen species" would be limited to atomic hydrogen and atomic oxygen or whether they could embrace molecular hydrogen and molecular oxygen. The term "species" embraces both the atomic species and the molecular species. If the Examiner thinks the claims are too broad in doing so, that is an issue of patentability, not ambiguity or indefiniteness.

Claims 15, 54 and 55 (originally Claims 15, 52 and 53) are being amended to eliminate the language which the Examiner has identified as being improper Markush terminology, but applicant does not agree that the use of the term "low" makes Claim 54 (original Claim 52) indefinite. The claim calls for a seed material having "a low ionization potential", and examples of materials having low ionization potentials are given in the specification (see, e.g., Page 14, lines 19 - 24). One skilled in the art would, therefore, know that a material having a low ionization potential is one having an ionization potential similar to that of the materials given as examples, and there is no ambiguity or indefiniteness.

With this explanation and the amendments which are being made, applicant trusts that the rejections under 35 U.S.C. §112 will be withdrawn.

Claims 1 - 23 and 26 - 58 (originally Claims 1 - 23 and 26 - 56) have also been rejected under 35 U.S.C. §103 as being unpatentable over the Japanese application (JP 56-017902) in view of Kogan (U.S. 5,397,559) or Lee et al. (U.S. 6,726,893). Reconsideration and withdrawal of that rejection is requested.

The Japanese application is cited as disclosing a process for forming hydrogen and oxygen by vaporizing water in air or an inert gas stream and dissociating at about 2500 °C in a microwave plasma. As the Examiner has acknowledged, this reference does not teach separation of the hydrogen and oxygen species within the plasma, and it likewise does not teach the formation of gaseous hydrogen and gaseous oxygen from the species. Instead, the oxygen is separated from the hydrogen after passing through the plasma using the paramagnetic properties of oxygen, as discussed in the last paragraph on Page 3 of the English translation.

Kogan and Lee et al. are cited as disclosing the separation of water into hydrogen and oxygen and as teaching that hydrogen and oxygen may be separated by passage through a membrane. As motivation for combining the teachings of Kogan and Lee et al. with those of the Japanese application, the Examiner suggests that it would be obvious to separate the hydrogen and oxygen formed in the process of the Japanese application by passage through a membrane since Kogan and Lee et al. establish the desirability of separating hydrogen and oxygen from thermally split water by use of membranes. That is a classic example of impermissible hindsight reconstruction in which the Examiner is selectively combining elements of different references when the only basis for doing so is applicant's own disclosure and claims. In this case, for example, why would it not be just as obvious to separate the hydrogen and oxygen in Kogan and Lee et al. by using the paramagnetic properties of oxygen, as taught by the Japanese reference?

Moreover, even if the teachings of the references are combined in the manner suggested by the Examiner, they still will not produce the invention. In that regard, it will be noted that the claims all specify that the hydrogen species and the oxygen species are separated within the plasma, not after it as in the Japanese reference or in some other environment as in Kogan and Lee et al.

Furthermore, taken individually or combined, the references fail to teach or even remotely suggest removing each of the oxygen species and the hydrogen species from the plasma so that the hydrogen species forms gaseous hydrogen and the oxygen species forms gaseous oxygen, as specified by the claims.

Claim 1 is being amended to place it in better form and, as amended, distinguishes over the teachings of the references in calling for the steps of injecting water molecules are into a plasma to dissociate the molecules into a hydrogen species and an oxygen species, separating the hydrogen species from the oxygen species within the plasma, and removing each of the oxygen species and the hydrogen species from the plasma so that the hydrogen species forms gaseous hydrogen and the oxygen species forms gaseous oxygen. Claims 2 - 23 and 26 - 58 (originally Claims 2 - 23 and 26 - 56) depend from Claim 1 and distinguish over the references for the same reasons as their amended parent claim, as well as calling for additional features and steps which are not found in the references.

Thus, the rejection of the claims as being obvious from the teachings of the Japanese reference in combination with those of Kogan and Lee et al. is clearly erroneous, and applicant trusts that it will be withdrawn.

Claims 1 - 16 have further been rejected under 35 U.S.C. §102 and 35 U.S.C. §103 as being anticipated by or unpatentable over Wootan et al. (U.S. 2005/0150164), and Claims 39 - 56 (original Claims 39 - 54) have been also rejected under 35 U.S.C. §103 as being unpatentable over Wootan et al. Reconsideration and withdrawal of those rejections is also requested.

In the process and device disclosed in Wootan et al., water is heated to produce high pressure steam which is passed through a vortex generator. When the spinning steam exiting the vortex generator reaches the threshold steam decomposition temperature, powdered carbon is introduced into the steam. The steam and the powdered carbon produce a so-called implosion vortex gas plasma in which the steam is decomposed into hydrogen and oxygen gas components in an exothermic reaction at temperatures between 2000 °C and 4500 °C, with the oxygen being combined with the carbon to form carbon dioxide gas [see Paragraph 0037]. That is a totally different process than applicant's invention.

In applicant's invention, water molecules are injected into a plasma to dissociate the molecules into a hydrogen species and an oxygen species, the hydrogen species is separated from the oxygen species within the plasma, and removing each of the oxygen species and the hydrogen species is removed from the plasma so that the hydrogen species forms gaseous hydrogen and the oxygen species forms gaseous oxygen. This is totally unlike the device and process of Wootan et al. which produce hydrogen gas

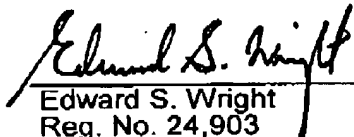
and carbon dioxide instead of hydrogen gas and oxygen gas. The hydrogen gas are produced from water and powdered carbon, and instead of being separated from the hydrogen, the oxygen is eliminated by consuming it. Unlike Wootan et al., in applicant's invention, it is not necessary to have a chemical reaction with a species other than water in order to eliminate oxygen so that it does not recombine with hydrogen, and applicant's invention does not produce carbon dioxide or any environmentally undesirable product.

As amended, Claim 1 distinguishes over Wootan et al. in calling for the steps of injecting water molecules are into a plasma to dissociate the molecules into a hydrogen species and an oxygen species, separating the hydrogen species from the oxygen species within the plasma, and removing each of the oxygen species and the hydrogen species from the plasma so that the hydrogen species forms gaseous hydrogen and the oxygen species forms gaseous oxygen. Claims 2 - 16 and 39 - 56 (original Claims 2 - 16 and 39 - 54) depend from Claim 1 and distinguish over Wootan et al. for the same reasons as their amended parent claim, as well as calling for additional features and steps which are not found in or suggested by Wootan et al.

With this amendment, it is respectfully submitted that Claims 1 - 61 are all directed to patentable subject matter and that the application is in condition for allowance.

The Commissioner is authorized to charge any fees required in this matter, including extension fees, to Deposit Account 50-2975, Order No. A-75148.

Respectfully submitted,


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